What is Claimed Is:

~~1. A method for up-converting a baseband signal, comprising the steps of:~~

~~(1) receiving the baseband signal; and~~

~~(2) differentially sampling the baseband signal according to a first control signal and a second control signal resulting in a plurality of harmonic images that are each representative of the baseband signal, wherein said first and second control signals have pulse widths that improve energy transfer to a desired harmonic image of said plurality of harmonics.~~

2. The method of claim 1, further comprising the steps of:

(3) selecting said desired harmonic from said harmonic images that are generated in step (2); and

(4) transmitting said desired harmonic over a communications medium.

3. The method of claim 1, further comprising the step of:

(3) minimizing DC offset voltages between sampling modules during step (2), and thereby minimizing carrier insertion in said harmonic images.

4. The method of claim 3, wherein step (3) comprises the step of maintaining a reference voltage between said sampling modules during said differential sampling.

5. The method of claim 1, wherein step (2) comprises the steps of:

(a) converting said baseband signal into a differential baseband signal having a first differential baseband component and a second differential baseband component;

(b) sampling said first differential component according to said first control signal to generate a first harmonically rich signal, and sampling said second

differential component according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted relative to said first control signal as measured by a master clock signal; and

(c) combining said first harmonically rich signal and said second harmonically rich signal to generate said harmonic images.

6. The method of claim 5, further comprising the step of:

(d) adding a reference voltage to said first differential component and said second differential component prior to step (b), and thereby minimizing any DC offset voltages during sampling of said first differential baseband component and said second differential baseband component.

7. The method of claim 5, wherein said step (b) of sampling comprises the steps of:

(i) generating said first control signal comprising a first plurality of pulses and said second control signal comprising a second plurality of pulses; and

(ii) operating a first switch according to said first control signal to periodically sample said first differential baseband component, and operating a second switch according to said second control signal to periodically sample said second differential baseband signal.

8. The method of claim 7, wherein said step (i) comprises the step of widening pulse widths of said first control signal and said second control signal by a non-negligible amount that tends away from zero time duration to extend the time that said first switch and said second switch is closed in step (ii), and thereby improving energy transfer to said desired harmonic image.

9. The method of claim 8, wherein said step of widening pulse widths comprises the step of widening pulse widths for said first and second control signals to a non-zero fraction of a period of the desired harmonic of interest.

10. The method of claim 8, wherein said step of widening pulse widths comprises the step of widening pulse widths for said first and second control signals to approximately one-half of a period of said desired harmonic of interest.

11. The method of claim 1, wherein said first control signal and said second control signal have a period of T_S so that said harmonics images repeat at $1/T_S$ in frequency, and wherein said second control signal is phase-shifted relative to said first control signal by approximately 180 degrees.

12. The method of claim 1, wherein said pulse widths of said first control signal and said second control signal are a non-zero fraction of a period of said desired harmonic of interest.

13. The method of claim 1, wherein said pulse widths of said first control signal and said second control signal are approximately one-half of a period of said desired harmonic of interest, and thereby improve energy transfer to said desired harmonic of interest.

14. The method of claim 1, wherein said pulse widths of said first control signal and said second control signal are approximately one-half of a period of said desired harmonic of interest, and thereby improve energy transfer to said desired harmonic of interest.

15. The method of claim 1, wherein said harmonic images have an amplitude that is proportional to the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right)\cdot\sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

where: T_S = period of said first and second control signals

T_A = pulse width of said first and second control signals

n= harmonic number of said harmonic image whose amplitude is determined.

16. The method of claim 1, wherein said harmonic images have an amplitude that is based on $n*(T_A/T_S)$, where T_S is a period of said first and second control signals, T_A is a pulse width of pulses in said first and second control signals, and n is a harmonic number of said harmonic image.

17. A method for up-converting a baseband signal, comprising the steps of:

(1) receiving the baseband signal; and

(2) differentially sampling the baseband signal according to a first control signal and a second control signal resulting in a plurality of harmonic images that are each representative of the baseband signal, wherein said first and second control

signals have pulse widths that are a non-negligible fraction of a period associated with a desired harmonic image.

18. The method of claim 17, wherein said pulse width are each approximately ½ a period associated with said desired harmonic, and thereby shifting energy into said desired harmonic.

19. The method of claim 17, further comprising the step of:

(3) minimizing DC offset voltages between sampling modules during said step (2), and thereby minimizing carrier insertion in said harmonic images.

20. The method of claim 19, wherein step (3) comprises the step of maintaining a reference voltage between said sampling modules during said differential sampling.

21. The method of claim 17, wherein step (2) comprises the steps of:

(a) converting said baseband signal into a differential baseband signal having a first differential baseband component and a second differential baseband component;

(b) sampling said first differential component according to said first control signal to generate a first harmonically rich signal, and sampling said second differential component according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted relative to said first control signal; and

(c) combining said first harmonically rich signal and said second harmonically rich signal to generate said harmonic images.

22. A method of up-converting a baseband signal, comprising the steps of:

(1) receiving a baseband signal and an inverted baseband signal;

(2) sampling the baseband signal according to a first control signal to generate a first harmonically rich signal;

(3) sampling said inverted baseband signal according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted relative to said first control signal;

(4) combining said first harmonically rich signal and said second harmonically rich signal to generate a third harmonically rich signal having harmonic images that are representative of said baseband signal; and

wherein pulse widths of said first control signal and said second control signal operate to improve energy transfer to a desired harmonic image in said third harmonically rich signal.

23. The method of claim 22, further comprising the step of:

(5) band-pass filtering the desired harmonic.

24. The method of claim 23, further comprising the step of transmitting said filtered harmonic over a communications medium.

25. The method of claim 22, further comprising the step of:

(5) minimizing DC offset voltages between controlled switches that perform said steps (2) and (3).

26. The method of claim 25, wherein step (5) comprises the step of coupling said controlled switches to a common reference voltage.

27. The method of claim 26, wherein step (5) comprises the step of coupling an input and an output of said controlled switches to said common reference voltage.

28. The method of claim 22, wherein said pulses of said first control signal and said second control signal are each a non-negligible fraction of a period of said desired harmonic.

~~29. The method of claim 22, wherein said pulses of said first control signal and said second control signal are each approximately one-half of a period of said desired harmonic.~~

30. The method of claim 22, wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are based on $n^*(T_A/T_S)$, where T_S is a period of said first and second control signal, and n is a harmonic number of said harmonic.

31. The method of claim 22, wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4 \sin\left(\frac{n\pi T_A}{T_s}\right) \cdot \sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

32. The method of claim 22, wherein said step (2) of sampling comprises the steps of:

(a) receiving said baseband signal at a first port of a switch; and

(b) operating said switch according to pulse widths T_A of said first control signal to transfer non-negligible amounts energy to a second port of said switch during said pulse widths T_A.

33. The method of claim 22, wherein said step (3) of sampling comprises the steps of:

(a) receiving said inverted baseband signal at a first port of a switch; and

(b) closing said switch during pulse widths T_A of said second control signal to transfer non-negligible amounts energy to a second port of said switch.

34. The method of claim 22, further comprising the step of amplifying said desired harmonic image.

35. The method of claim 22, further comprising the step of:

(5) adding a voltage offset between controlled switches that perform said sampling in steps (2) and steps (3), thereby causing carrier insertion in said harmonic images that comprise said harmonically rich signal.

36. The method of claim 22, wherein step (2) comprises the step of shunting the baseband signal to ground according to said first control signal.

37. The method of claim 34, wherein step (3) comprises the step of shunting the inverted baseband signal to ground according to said second control signal.

38. A method of up-converting a baseband signal, comprising the steps of:

(1) receiving a baseband signal and an inverted baseband signal;

(2) adding a common reference voltage to the baseband signal and the inverted baseband signal, to generate a first combined signal and a second combined signal, respectively;

(2) sampling said first combined signal according to a first control signal to generate a first harmonically rich signal;

(3) sampling said second combined signal according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted approximately 180 degrees relative to said first control signal;

(4) combining said first harmonically rich signal and said second harmonically rich signal to generate a third harmonically rich signal having harmonic images that are representative of said baseband signal;

wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are based on $n^*(T_A/T_S)$, where T_S is a period of said first and second control signal, and n is a harmonic number of said harmonic; and

wherein T_A established to improve energy transfer to a desired harmonic image in said third harmonically rich signal.

39. The method of claim 38, wherein said pulses of said first control signal and said second control signal are a non-negligible fraction of a period of said desired harmonic.

40. The method of claim 38, wherein said pulses of said first control signal and said second control signal are approximately one-half of a period of said desired harmonic.

41. The method of claim 38, wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right)\cdot\sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

SUB A4

42. A method of up-converting a baseband signal, comprising the steps of:

(1) receiving a baseband signal and an inverted baseband signal;

(2) adding a common reference voltage to the baseband signal and the inverted baseband signal, to generate a first combined signal and a second combined signal, respectively;

(2) shunting said first combined signal to ground according to a first control signal to generate a first harmonically rich signal;

(3) shunting said second combined signal to ground according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted approximately 180 degrees relative to said first control signal so that second combined signal is not shunted to ground simultaneous with said first combined signal;

(4) combining said first harmonically rich signal and said second harmonically rich signal to generate a third harmonically rich signal having harmonic images that are representative of said baseband signal;

wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are based on $n*(T_A/T_S)$, where T_S is a period of said first and second control signal, and n is a harmonic number of said harmonic; and

wherein pulse widths of said first control signal and said second control signal are established to improve energy transfer to a desired harmonic image in said third harmonically rich signal.

43. The method of claim 42, wherein said pulses of said first control signal and said second control signal are a non-negligible fraction of a period of said desired harmonic.

44. The method of claim 42, wherein said pulses of said first control signal and said second control signal are approximately one-half of a period of said desired harmonic.

45. The method of claim 42, wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said third harmonically rich signal are represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right)\cdot\sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

46. A method of transmitting an IQ signal, the method comprising the steps:

(1) receiving an I baseband signal and a Q baseband signal;

(2) differentially sampling the I baseband signal according to a first control signal and a second control signal, to generate an I harmonically rich signal;

(3) differentially sampling the Q baseband signal according to said first control signal and said second control signal, to generate a Q harmonically rich signal;

(4) combining said I harmonically rich signal and said Q harmonically rich signal, to generate a IQ harmonically rich signal, said IQ harmonically rich signal having multiple harmonic images that contain information for reconstruction of the I and Q baseband signals; and

wherein said first and second control signals have pulse widths established to improve energy transfer to a desired harmonic image in said I and Q baseband signals.

47. The method of claim 46, further comprising the steps of:

(5) minimizing DC offset voltages between sampling modules during said sampling in step (2) and step (3).

48. The method of claim 47, wherein step (5) comprises the step of coupling said sampling modules to a common reference voltage.

49. The method of claim 47, wherein step (5) comprises the step of coupling said sampling modules to ground.

50. The method of claim 46, further comprising the step of:

(5) selecting said desired harmonic from said harmonically rich signal.

51. The method of claim 50, further comprising the step of:

(6) transmitting said desired harmonic over a communications medium.

52. The method of claim 46, wherein said pulses of said first control signal and said second control signal are a non-negligible fraction of a period of said desired harmonic.

53. The method of claim 46, wherein said pulses of said first control signal and said second control signal are approximately one-half a period of said desired harmonic.

54. The method of claim 46, wherein said pulses of said first and second control signals have a pulse width of T_A, and wherein an amplitude of said harmonics in said IQ harmonically rich signal are based on $n*(T_A/T_S)$, where T_S is a period of said first and second control signal, and n is a harmonic number of said harmonic.

55. The method of claim 46, wherein an amplitude of said harmonics is represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right) \cdot \sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

56. The method of claim 46, wherein step (2) comprises the steps of:

(a) inverting the I baseband signal, resulting in an inverted I baseband signal;

(b) sampling the I baseband signal according to the first control signal, and sampling said inverted I baseband signal according to said second control signal, wherein said second control signal is approximately 180 degree out-of-phase with respect said first control signal.

57. The method of claim 56, further comprising the step of combining a reference voltage with said I baseband signal and said inverted I baseband signal prior to said step of sampling.

58. The method of claim 56, wherein said step (b) comprises the steps of:

(i) operating a first switch that samples said I baseband signal according to said first control signal; and

(ii) operating a second switch that samples said inverted I baseband signal according to said second control signal.

59. The method of claim 46, wherein step (3) comprises the steps of:

(a) inverting the Q baseband signal, resulting in an inverted Q baseband signal;

(b) sampling the Q baseband signal according to the first control signal, and sampling said inverted Q baseband signal according to said second control signal,

wherein said second control signal is approximately 180 degree out-of-phase with respect said first control signal.

60. The method of claim 59, further comprising the step of combining a reference voltage with said Q baseband signal and said inverted Q baseband signal prior to said step of sampling.

61. The method of claim 59, wherein said step (b) comprises the steps of:

(i) operating a first switch that samples said Q baseband signal according to said first control signal; and

(ii) operating a second switch that samples said inverted Q baseband signal according to said second control signal.

62. The method of claim 46, wherein step (2) comprises the steps of:

(a) inverting the I baseband signal, resulting in an inverted I baseband signal;

(b) shunting the I baseband signal to ground according to the first control signal, and shunting the inverted I baseband signal to ground according to said second control signal, wherein said second control signal is approximately 180 degree out-of-phase with respect said first control signal.

63. The method of claim 46, wherein step (3) comprises the steps of:

(a) inverting the Q baseband signal, resulting in an inverted I baseband signal;

(b) shunting the Q baseband signal to ground according to the first control signal, and shunting the inverted Q baseband signal to ground according to said second control signal, wherein said second control signal is approximately 180 degree out-of-phase with respect said first control signal.

64. The method of claim 46, further comprising the step of:

(5) generating said first control signal and said second control signal, comprising the steps of:

(a) receiving a master clock signal having a frequency ($1/T_S$) that is a sub-harmonic of said desired frequency;

(b) generating pulses in said first control signal to correspond with rising edges of said master clock signal; and

(c) generating pulses in said second control signal to correspond with falling edges of said master clock signal.

~~65. The method of claim 64, wherein said pulses in said first control signal and said second control signal have a pulse width T_A that are established to improve energy transfer to said desired harmonic in said IQ harmonically rich signal.~~

~~66. The method of claim 65, wherein said pulse width T_A is a non-negligible fraction of a period associated with said desired harmonic in said IQ harmonically rich signal.~~

67. A method of transmitting an IQ signal, the method comprising the steps:

(1) receiving an I baseband signal and a Q baseband signal;

(2) inverting said I baseband signal and said Q baseband signal, resulting in an inverted I baseband signal and an inverted Q baseband signal, respectively;

(3) summing a reference voltage with said I baseband signal and said inverted I baseband signal, resulting in a first I combined signal and a second I combined signal, respectively;

(4) summing said reference voltage with said Q baseband signal and said inverted Q baseband signal, resulting in a first Q combined signal and a second Q combined signal, respectively;

(5) sampling said first I combined signal according to a first control signal, and sampling said second I combined signal according to said second control signal, resulting in a first and second harmonically rich signals, respectively;

(6) sampling said first Q combined signal according to a first control signal, and sampling said second Q combined signal according to said second control signal, resulting in a first and second Q harmonically rich signals, respectively;

(7) combining said first I harmonically rich signal and said second I harmonically rich signal to generate a third I harmonically rich signal, said third I harmonically rich signal having multiple harmonic images that are each representative of the I baseband signal;

(8) combining said first Q harmonically rich signal and said second Q harmonically rich signal to generate a third Q harmonically rich signal, said third Q harmonically rich signal having multiple harmonic images that are each representative of the Q baseband signal;

(9) combining said third I harmonically rich signal and said third Q harmonically rich signal to generate an IQ harmonically rich signal, said IQ harmonically rich signal having multiple harmonic images that are each representative of said I baseband signal and said Q baseband signal; and

wherein said harmonic images in said IQ harmonically rich signal repeat at a multiple of $1/T_S$, where T_S is a period associated with said first control signal and said second control signal.

68. The method of claim 67, wherein step (9) comprises the steps of phase shifting said third Q harmonically rich signal relative to said third I harmonically rich signal.

69. The method of claim 67, wherein said second control signal is phase shifted relative to said first control signal.

70. The method of claim 67, wherein said second control signal is phase shifted approximately 180 degrees relative to said first control signal.

71. The method of claim 67, wherein said first control signal and said second control signal have pulse widths T_A that is established to improve energy transfer to a desired harmonic image in said IQ harmonically rich signal.

72. The method of claim 71, wherein said pulse widths T_A are approximately one-half of a period associated with said desired harmonic.

73. The method of claim 71, wherein an amplitude of said harmonic images in said IQ harmonically rich signal are based on $n^*(T_A/T_S)$, where n is a harmonic number of said harmonic image.

74. The method of claim 71, wherein an amplitude of said harmonic images is represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right) \cdot \sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

SUB A1

75. A system for up-converting a baseband signal, comprising:

means for inverting said baseband signal, resulting in an inverted baseband signal;

first sampling means for sampling said baseband signal according to a first control signal, resulting in a first harmonically rich signal;

second sampling means for sampling said inverted baseband signal according to a second control signal, resulting in a second harmonically rich signal;

means for combining said first harmonically rich signal and said second harmonically rich signal, resulting in a third harmonically rich signal, wherein said third harmonically rich signal contains multiple harmonic images that are each representative of said baseband signal;

wherein said first and second control signals have a period of T_S so that said harmonic images repeat at multiples of $1/T_S$;

wherein said second control signal is phase shifted relative to said first control signal; and

wherein said first and second control signal comprise pulses having an associated pulse width T_A that operates to improve energy transfer to a desired harmonic image in said harmonically rich signal.

76. The system of claim 75, wherein said pulse width T_A is approximately one-half a period associated with said desired harmonic.

77. The method of claim 75, wherein an amplitude of said harmonic images is represented by the following equation:

$$\mathrm{Amp}_n = \left[\frac{4\sin\left(\frac{n\pi T_A}{T_s}\right)\cdot\sin\left(\frac{n\pi}{2}\right)}{n\pi} \right]$$

wherein: T_S = period of said first and second control signals;

T_A = pulse width of said first and second control signals; and

n= harmonic number of said harmonic image whose amplitude is determined.

78. The system of claim 75, further comprising:

means for limiting offset voltages between said first sampling means and said second sampling means.

79. The system of claim 78, wherein said means for limiting comprises a means for distributing a reference voltage to said first sampling means and said second sampling means.

80. The system of claim 79, wherein said means for distributing comprises a means for summing said reference with said baseband signal and said inverted baseband signal.

81. The system of claim 75, further comprising a means for selecting said desired harmonic from said third harmonically rich signal.

82. The system of claim 75, wherein said first sampling means comprises a means for shunting said baseband signal to ground according to said first control signal, and

wherein said second sampling means comprises a means for shunting said inverted baseband signal to ground, according to said second control signal.

Sub B1

83. A system of transmitting an IQ signal, the method comprising the steps:

(1) means for receiving an I baseband signal and a Q baseband signal;

(2) first differential sampling means for sampling the I baseband signal according to a first control signal and a second control signal, to generate an I harmonically rich signal, wherein said second control signal is phase shifted relative to said first control signal;

(3) second differential sampling means for sampling the Q baseband signal according to said first control signal and said second control signal, to generate a Q harmonically rich signal;

(4) means for combining said I harmonically rich signal and said Q harmonically rich signal, to generate an IQ harmonically rich signal, said IQ harmonically rich signal having multiple harmonic images that contain amplitude and frequency information for reconstruction of the I and Q baseband signals;

wherein said first and second control signals have a period of T_S so that said harmonic images repeat at multiples of $1/T_S$; and

wherein said first and second control signal comprise pulses having an associated pulse width T_A that operates to improve energy transfer to a desired harmonic image in said harmonically rich signal.

84. The system of claim 83, wherein said T_A is approximately one-half a period of said desired harmonic.

Sub B2

85. An apparatus for transmitting a baseband signal, said apparatus comprising:

a buffer/inverter, for receiving said baseband signal and generating an inverted baseband signal;

a terminal for receiving a reference voltage;

a first summer, coupled to a first output of said buffer/inverter and said terminal, said first summer summing said reference voltage with said baseband signal and resulting in a first combined signal;

a second summer, coupled to a second output of said buffer inverter and said terminal, said second summer summing said reference voltage with said inverted baseband signal and resulting in a second combined signal;

a first controlled switch, coupled to an output of said first summer, said first controlled switch sampling said first combined signal according to a first control signal, and resulting in a first harmonically rich signal;

a second controlled switch, coupled to an output of said second summer, said second controlled switch sampling said second combined signal according to a second control signal, and resulting in a second harmonically rich signal;

a combiner, coupled to an output of said first controlled switch and an output of said second controlled switch, said combiner combining said first harmonically rich signal and said second harmonically rich signal, resulting in an third harmonically rich signal;

wherein said first control signal and said second control signal comprises pulses having a pulse width T_A that operates to improve energy transfer to a desired harmonic is said third harmonically rich signal; and

wherein said first control signal and said second control signal are phase shifted with respect to each other.

86. The apparatus of claim 85, further comprising an inductor coupled between said terminal and said outputs of said first and second controlled switches, and thereby distributing said reference voltage to said outputs of said controlled switches.

87. The apparatus of claim 86, wherein:

said first controlled switch comprises a first field effect transistor (FET), a gate of said first FET coupled to said first control signal, a source of said first FET receiving said first combined signal, and a drain of said first FET outputting said first harmonically rich signal;

said second controlled switch comprises a second field effect transistor (FET), a gate of said second FET coupled to said second control signal, a source of said second FET receiving said second combined signal, and a drain of said second FET outputting said second harmonically rich signal.

88. The apparatus of claim 87, wherein said first FET conducts according to said pulses of said first control signal, and said second FET conducts according to said pulses of said second control signal.

~~89. The apparatus of claim 87, wherein said pulse width T_A associated with said first and second control signal is a non-negligible fraction of a period associated with a desired harmonic in said third harmonically rich signal.~~

~~90. The apparatus of claim 89, wherein said pulse width T_A is approximately one-half a period of said desired harmonic image.~~

91. The apparatus of claim 85, further comprising a bandpass filter coupled to an output of said combiner to select said desired harmonic from said harmonically rich signal.

SUB A9

92. An apparatus for transmitting a baseband signal, said apparatus comprising:

a buffer/inverter, for receiving said baseband signal and generating an inverted baseband signal,

a first controlled switch, coupled to an output of said buffer/inverter, said first controlled switch shunting said baseband signal to ground according to a first control signal, and resulting in a first harmonically rich signal;

a second controlled switch, coupled to a second output of said buffer/inverter, said second controlled switch shunting said inverted baseband signal to ground according to a second control signal, and resulting in a second harmonically rich signal;

a combiner, coupled to an output of said first controlled switch and an output of said second controlled switch, said combiner combining said first harmonically rich signal and said second harmonically rich signal, resulting in an third harmonically rich signal;

wherein said first control signal and said second control signal comprises pulses having a pulse width T_A that operate to improve energy transfer to a desired harmonic is said third harmonically rich signal; and

wherein said first control signal and said second control signal are phase shifted with respect to each other.

93. The apparatus of claim 92, wherein:

said first controlled switch comprises a first field effect transistor (FET), a gate of said first FET coupled to said first control signal, a source of said first FET receiving said baseband signal and outputting said first harmonically rich signal, and a drain of said first FET coupled to ground; and

said second controlled switch comprises a second field effect transistor (FET), a gate of said second FET coupled to said second control signal, a source of said second FET receiving said inverted baseband signal and outputting said second harmonically rich signal, and a drain of said second FET coupled to ground.

94. The apparatus of claim 93, wherein said first FET and said second FET alternately shunt said baseband signal and said inverted baseband signal to ground, respectively, according to said first control signal and said second control signal, to generate said harmonically rich signals.

95. The apparatus of claim 92, wherein said pulse width T_A is approximately one-half of a period associated with said desired harmonic in said third harmonically rich signal.